The Quest for Measures of Site Condition in a Military Installation Context

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Abstract

The SERDP Ecosystem Management Project (SEMP) is a uniquely-formed effort which proposes to assist military installation land managers to better manage the ecosystems among which the base has been located. Frankly, the exact means by which one may implement a long-term improvement goal are often not clearly known, and adaptive management tools will be developed, based on the SEMP research studies, to assist managers in this goal. During the course of our early studies, each team selected study sites with reference only to that team's needs. Qualitative designations of relative condition were adequate, e.g., our "high impact" plots. Across the teams, however, the need arose to be able to relate the site condition among all sites (now more than 800), and the qualitative, relative designations broke down. Further, what did the terms mean, anyway? Is an almost barren site a sure sign of heavy military use? Or, just that it is an infertile place where recovery is very slow? Or that it is an old building site? A former road or trail? Further, are all the "highly disturbed" sites equivalent? Clearly, they were not. This need for cross-study coordination was not clearly envisioned in the original planning process, and thus was not transmitted to the research teams. How may we recover from this oversight? The SEMP Technical Advisory Committee agreed on some important principles, among them that since actual (historic) military use is not known, nor is intensity of the disturbance quantifiable, that site condition parameters (that is, a change in ecological condition) represent the measurable evidence of cumulative anthropogenic use and/or environmental processes and events for a given site. Based on this starting point, elements such as vegetation structure, soil compaction, microfloral populations, plant productivity, soil and sediment carbon, historical land use to the extent knowable, surface cover, and others, some of which were already a focus of SEMP study, were identified as a basis for index development. The research teams shared information already available, and, in a workshop setting with contributions from outside scientists, developed an index scale to be used for cross-site comparisons. The data necessary to compute index values are being acquired at this time, and will be supplemented with data from satellite and aerial imagery to form the final product. This process should be applicable to similar needs at other military and non-military locations.

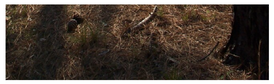
The Problem

The SEMP Project was established to assist land managers implement their plans through identifying indicators of change which could then be monitored regularly to determine the 'direction" in which the installation environment was "moving." Fort Benning, GA volunteered to host the project. The research teams involved in this study have been working for almost three years, and have tentatively proposed several such indicators, or combinations of them, for this purpose. Some time after the studies had begun, and about when they were reporting on the results of their first full year of results, it became clear that the initial characterization of their study sites into areas of "low," "moderate," and "high" disturbance was too imprecise to allow cross-project comparisons of impact.

Our Dilemma

It was not difficult to agree on certain conditions, for example:

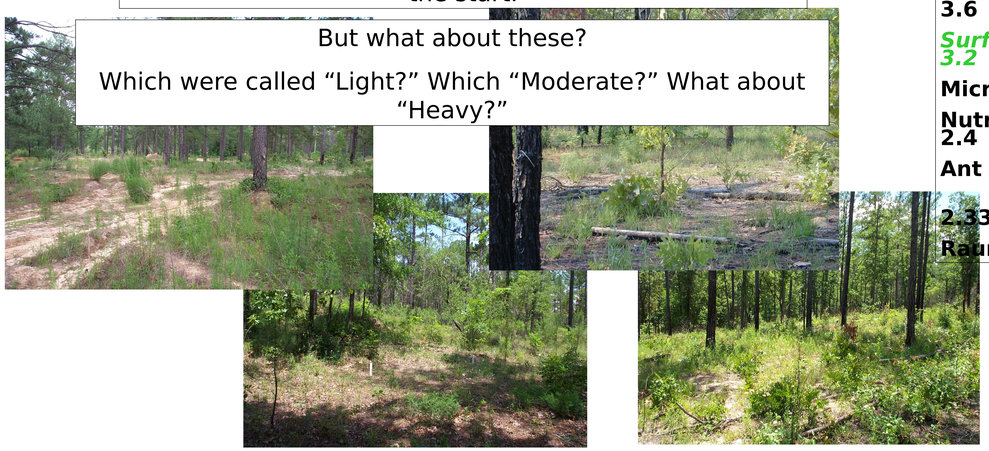
While these sites all show almost no disturbance



That was the easy part! Everyone mostly agreed from the start.

But what about these?

Which were called "Light?" Which "Moderate?" What about "Heavy?"



Now you see a little more of the problem facing SEMP researchers

Criteria for Indicators Were Established by Advisory Committee

1) A parameter must be currently measured, measurable, or knowable.
2) A parameter must be related to anthropogenic activity (e.g., military operations), environmental patterns, processes, and events, or both.
3) Obtaining and analyzing the parameter must be cost effective, with consideration given to use of the parameter for both current and future potential sites..
4) A parameter must be transferable to other projects and other installations.
5) The set of parameters needs to apply to both terrestrial and aquatic systems.
6) The set of parameters needs to apply to multiple scales (spatial and temporal).
7) The set of parameters needs to reflect historical legacies (i.e., the range of pre-military use to current use, at least to the extent that we know it

Parameters Ranked by PIs

Element	Score
A-Horizon Soil Depth	*4.8*
Soil/sediment Carbon	*4.6*
Soil Compaction (bulk density)	*4.4*
Vegetation Structure	*4*
Species Composition	*4*
Historical Land Use	**3.8**
Soil/Sediment Nitrogen	*3.75*
Plant Productivity	**3.6**
Surface cover (via RS)	*3.2*
Microflora	**2.4**
Nutrient Leakage	**2.4**
Ant Community Structure	**2.33**
Raunkiaer Life Form	**2.2**

Proposed for Test of Index Development

(Canopy cover)

- First plan was to use only top 5 items
- Soil N was moved up since most analyses provide C/N in single step
- Surface cover moved up, and canopy cover added as simple and relevant
- New full set includes 8 parameters
- Agreed that these were the "easy to use" set, not necessarily the "best" technically

On 30 Oct 02, teams agreed to limit our first phase to the top 3 parameters.

First datasets to be tested were A-horizon depths. Data were in hand for many groups. Could provide a "quick check" of logic of this approach.

Graph at lower right shows distribution of 600 grouped measurements of A-horizon depth. Data are from two teams at this time.

Note that the (previously designated) higher impact sites *do* group at the lower values; the (putative) lower disturbance sites at higher values, and the "medium" sites are intermediate.

See Poster #105 for further application of the A-horizon data in a